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Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

The equations of motion are

$$\frac{d^2x}{dt^2}+2\omega\sin\lambda\frac{dy}{dt}=0,\ \frac{d^2y}{dt^2}-2\omega\cos\lambda\frac{dz}{dt}-2\omega\sin\lambda\frac{dx}{dt}=0,\ \frac{d^2z}{dt^2}+2\omega\cos\lambda\frac{dy}{dt}=-g.$$

(Routh's *Advanced Rigid Dynamics*, fourth edition, page 20.)

As a first approximation, we can neglect the motion of the earth. Then, from mechanics, $x=0$, $y=0$, $z=vt-\frac{1}{2}gt^2$.

$$\therefore \frac{dx}{dt}=0,\ \frac{dy}{dt}=0,\ \frac{dz}{dt}=v-gt.$$

$$\therefore \frac{d^2x}{dt^2}=0,\ \frac{d^2y}{dt^2}=2\omega\cos\lambda(v-gt).$$

$\therefore$ $x=0$, $y=\omega\cos\lambda(vt^2-\frac{1}{3}gt^3)$. But $t=2v/g$.

$\therefore$ $x=0$, $y=\omega\cos\lambda(4v^3/g^2-8v^3/3g^2)=4\omega\cos\lambda(v^3/3g^2)$.

$\therefore$ deviation south$=0$, west$=4\omega\cos\lambda(v^3/3g^2)$.

AVERAGE AND PROBABILITY.

67. Proposed by HENRY HEATON, M. Sc., Atlantic, Ia.

A witness in court who undertook to recognize the signature of an individual failed four times in succession. What is the probability that he was correct the fifth time? An actual occurrence.

Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chaster High School, Chester, Pa., and CHARLES CARROLL CROSS, Libertytown, Md.

Let p=chance, p_1=chance of failure.

$$\therefore p_1=\frac{\int_0^1 x^5dx}{\int_0^1 x_4dx}=\tfrac{5}{6}.\quad \therefore p=1-\tfrac{5}{6}=\tfrac{1}{6}.$$

68. Proposed by J. K. ELLWOOD, A. M., Principal of Colfax School, Pittsburg, Pa.

What are the odds against throwing 7 or 11 at one throw with two dice?

I. Solution by CHARLES CARROLL CROSS, Libertytown, Md.

Each dice may fall in any one of 6 ways, therefore, both dice in $6\times6=36$ ways.

$11=6+5$ or $5+6$; hence the chance against throwing 11 at one throw is $1-\frac{2}{36}=\frac{17}{18}$.